side of *her* clan. Even now, among the Bedouins, a woman, it seems, rarely leaves her tribe, but strangers readily marry and settle in the tribe of their brides.

In the fourteenth century, a wife of the women of Zebîa would never follow a stranger husband, and she kept the children. The women of the Jâhîlya had the right to dismiss their husband, *the tent was theirs*. Ammianus mentions the gift of the wife to the bridegroom, a spear and a tent, he dwelt in *her* tent, and followed her people to the washing of spears. All this means *beena* marriage, as it is called in Ceylon. In marriages by capture, necessarily, the opposite rule prevailed. A woman went with the husband to his people, he is her lord, or *ba'al*, and thus *ba'al* marriage is the reverse of *beena* marriage. Purchase of wives naturally produced marriages of a *ba'al* type. As the two latter forms of marriage prevailed, women lost that independence in the wedded condition which they had enjoyed under *beena* marriage, thanks to the kindred of their own blood who surrounded them. Prof. Robertson Smith goes on to show the existence of various shapes of polyandry in early Arabia; there were "small sub-groups having property and wives in common as in Tibetan polyandry." In short, at the Prophet's time, the Arabs had already the orthodox family system with a paterfamilias, but previously there had been a system with a materfamilias, the house and children were hers, succession was through mothers, and the husband came to the wife, not the wife to the husband. The end of the book (Chapters VII. and VIII.) deals with traces and survivals of totemism. A list of tribal names derived from animals is given: the evidence that the animals were totems, worshipful, and not to be slain or eaten, is, naturally, scanty. In fact, though the analogies strongly point to the existence of totemism at a remote period in Arabia, I do not think the evidence will have much effect on the minds of the people who dismiss totems with the remark that they should be spelled *otes* or *otems*. A note (2, p. 221, see p. 304) is more to the point and more convincing. This note is of great religious interest and importance.

The tendency of the book, on the whole, is to show that among the Semitic races, as among Red, Black, and Yellow men, the matriarchal preceded the patriarchal family, and the totem kindred preceded the *gens*. That is precisely what one believes, but it is not in this generation that the doctrine will be universally accepted. In the case of Arabia proof is peculiarly difficult, as the reforms of the Prophet did so much to veil the remains of earlier religion and custom. It would be superfluous to praise a book so learned and masterly as Prof. Robertson Smith's; it is enough to say that no student of early history can afford to be without "Kinship in Early Arabia."

ANDREW LANG

FIELD'S CHROMATOGRAPHY

Field's Chromatography; a Treatise on Colours and Pigments, for the Use of Artists. Modernised by J. Scott Taylor, B.A. (London: Winsor and Newton, 1885.)

The Artists' Manual of Pigments. By H. C. Standage. (London: Crosby Lockwood and Co., 1886.)

THE new edition of "Field's Chromatography" differs in two important particulars from the previous issues of this well-known treatise. Firstly, one-third of the volume is devoted to a discussion of such parts of the modern theory of chromatics as bear upon the practice of the painter; secondly, a large number of useless or disused pigments and of substances suggested for use as pigments have been excluded from the pages before us. In accuracy and compactness this hand-book has undoubtedly been much improved, but it affords the student very little information upon two of the most important aspects in which artists should study their paints—those, namely, of purity and permanence. For instance, we are informed on p. 72 that "the artist will be told all that is known, outside manufacturing circles, of the constitution of his pigments." How is this promise redeemed? We turn to the description of white lead (pp. 97–101);—not a word can we find as to the presence in it of intentional adulterants or of such a frequent and injurious impurity as lead subacetate. We search in the same way and with the same result for some of the most rudimentary scraps of information as to the chemical characters and tests for the purity of vermilion, cadmium yellow, and artificial ultramarine. Then too we find statements as to individual pigments which are positively incorrect. It is not strictly true that the Naples yellow now sold is an imitation of the original pigment. One London house sells the original pigment—an antimoniate of lead, another supplies an equally good paint in which some oxide of zinc is associated with the antimoniate; neither preparation is an "imitation," made, say, with cadmium yellow and zinc white, and falsely called "Naples yellow." The question of permanence is not adequately discussed in this volume. We want numerical values representing the degrees of change suffered by those pigments with which the artist cannot dispense but which are known to alter under exposure. For example, it is misleading to call brown madder "very permanent" (p. 155): let any one try the effect of an exposure to a single summer's sunshine of a wash of this paint on a sheet of pure white paper. The same criticism applies to the statement (on p. 115) that the madder lakes are "not liable to change by the action of light." Certainly they cannot be termed fugitive in the same sense as the cochineal lakes, but they are by no means permanent. The editor of "Field's Chromatography" should have given more attention to gradations in the amount and nature of the colour-changes suffered by comparable pigments. In the tables of pigments in the appendix (pp. 171-185) no distinction is made between pigments used as oil-colours and those employed in water-colour drawings, although it is notorious that the medium has a marked effect upon the degree of stability shown by many pigments. And we altogether object to the accuracy of Table IV. (p. 176). Several of the pigments named in that list are entirely unaffected "by admixture with ochres and other ferruginous substances" instead of being "decomposed" by them as there stated.

The second work on our list has very slight claims on our attention. Mr. Standage's "Manual of Pigments" is stated on its title-page to show the composition of pigments, their degrees of permanency, their adulterations, and their mutual action; it also offers "the most reliable tests of purity." But when we examine into the chemical details given under the heads of the individual pigments we find that this compilation teems with the most ludicrous blunders. We proceed to cite a few of these, which need

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neither note nor comment in order to be fully appreciated by our scientific readers. On p. 1 we are informed that baryta white (barium sulphate) "consists of 137 equivalents (!) of barium, 32 equivalents of sulphur, and 64 equivalents of oxygen." On p. 3 we are furnished with an elegant test for the detection of free sulphuric acid in baryta white; we are directed to "add a few fragments of loaf-sugar to a largely diluted *solution* of the pigment, and evaporate to dryness. A black charred residue indicates free sulphuric acid." We are told (p. 7) that calcium imparts a *green* coloration to the blow-pipe flame. In testing verdigris for sulphate of copper we are informed (p. 21) that "sulphuretted hydrogen will throw down the *sulphur* present in it." Cœruleum (oxides of tin and cobalt) is stated to be made (p. 26) of "carbonate of soda 15 parts, powdered flint 20, and copper 3." Thénard's cobalt blue is "a salt of calcium calcined with alumina or oxide of tin" (p. 27). Indian yellow (p. 39) is "uriophosphate of lime" identical with "a magnesium salt of a curious acid called euxanthic." In order to see whether cadmium red (p. 47) contains any lead, "mix with white lead (!), boil in water, and add SH_2 to the solution." Red lead is said (p. 55) to undergo a "rapid oxidation" when mixed with sulphuretted hydrogen. Vermilion "must not be used with iodine" (p. 58). When chromate of lead is mixed with sulphide of cadmium, sulphide of lead is formed, and chromium, oxygen, and metallic cadmium are set free (p. 74). The iron in yellow ochre will if mixed with Naples yellow (antimoniate of lead) abstract oxygen from the latter and become deeper in tone (p. 76). Enough of Mr. Standage's chemistry: one line as to the value of his statements as to the theory of chromatics. On p. 81 he is good enough to inform us that from his own knowledge of colour-science he remains "steadfast to the old original theory of red, yellow, and blue being the three primaries."

We should not have devoted so much space to this curious little book if the present issue had been a first edition. But the majority of the extraordinary statements cited above were published by Mr. Standage in a work called the "Artists' Table of Pigments," of which the "Artists' Manual of Pigments" is to be regarded as a revision and enlargement.

OUR BOOK SHELF

American Journal of Mathematics, vol. viii. Nos. 1 and 2. (Baltimore, 1885, 1886.)

THIS volume opens with a memoir by Capt. MacMahon, R.A., on seminvariants, in which the author continues the discussion of the asyzygetic seminvariants commenced by him in vol. vi., No. 2 (see also vol. vii. No. 1). Mr. J. Hammond contributes "Syzygy Tables for the Binary Quintic." One table replaces in part the enumeration given by Prof Cayley in his tenth memoir on Quantics (*Phil. Trans.*, part 2, 1878) and that given by Prof. Sylvester (*Amer. Journ*, vol. iv. p. 58). The same writer has two papers in No. 2—one "On Perpetuants, with Applications to the Theory of Finite Quantics," this is a subject familiar to the readers of the *Journal* through Prof. Sylvester's brilliant papers, and is handled in the author's usual accurate and clear manner; the second paper is on "The Cubi-quadric System," and is likewise a following out of previous papers in the *Journal* the size of whose paper is admirably suited for such lengthy and wide tables. P. Seelhoff has two papers on the theory of numbers, "Prüfung grösserer Zahlen auf ihre Eigenschaft als Primzahlen" and "Nova methodus numeros compositos a primis dignoscendi illorumque factores dignoscendi." The first is a continuation of a paper in vol. iii. No. 3, and puts in the forefront a remark of Mr. Glaisher's: "The process of determining without a table the factors of a number is excessively laborious. Thus to determine, for example, whether the number 8559091 is or is not a prime, would require a long day's work." Upon this the writer remarks "Sehen wir zu!" There are ten pages of tables. The memoir by Dr. Emory McClintock entitled "Analysis of Quintic Equations," is a very interesting and apparently thorough discussion of the subject, with full historic references. Dr. T. Craig contributes a paper "On Linear Differential Equations whose Fundamental Integrals are the successive derivatives of the same function." This paper runs on into No. 2. The same writer closes the number with a memoir "On a Linear Differential Equation of the Second Order." Messrs. E. H. Moore and C. N. Little, in their "Note on Space Divisions," follow on the lines of Pilgrim's "Ueber die Anzahl der Theile, in welche ein Gebiet k^{ter} Stufe durch n Gebiete $(k-1)^{ter}$ Stufe getheilt werden Kann," and discuss the division of flat space of k dimensions by flat spaces of $k-1$ dimensions. In a "Note on a Roulette" Dr. A. V. Lane discusses that generated by the rolling of an ellipse on a right line, one extremity of the major axis being the generating point. Mr. H. B. Fine contributes a paper "On the Singularities of Curves of Double Curvature," and Mr. J. C. Fields has a notelet, "Proof of the Theorem—the equation $f(z)=0$ has a root where $f(z)$ is any holomorphic function of z."

Burma, as it was, as it is, and as it will be. By James George Scott ("Shway Yoe"). (London: George Redway, 1886.)

MR. SCOTT'S position as a competent and instructive writer on Burma was assured by his volume on "The Burman; his Life and Notions," published a few years ago. In this work he showed an intimate knowledge of the habits and modes of thought of the Burmese which could only have been acquired by a mastery of the language and a familiarity with the inner life of the people such as few Europeans can obtain of any Oriental nation. The present work is, no doubt, published in view of recent political events which have naturally attracted public attention especially to Upper Burma. In it the reader will find the whole subject treated in a general way, the first section being devoted to history, the second to geography, the third to "the people," under which head we find information respecting the method of administration, the religion, superstitions, and social habits of the Burmese. It is inevitable that the book should have a somewhat encyclopædic air, but Mr. Scott's entertaining style should gild the pill for the "general reader." Moreover, there are no really popular books in which the comprehensive information here given can be obtained in English. The average reader can hardly be expected to master the large works of Fytche, Yule, Craufurd, and others, merely in order to get some accurate information about one small portion of the British Empire. In this respect the book is of a kind more familiar to French than to English readers; but it is much more than a mere catchpenny publication to meet a superficial and temporary demand. Readers of this journal, for example, may find much in it of special interest to them. The sketch of Burmese cosmogony and mythology is very interesting. The story of the forbidden fruit is familiar in Burma, the place of the apple being taken by the seeds of a species of creeper, and the fall being gradual instead of immediate.

Another point of much importance at the present moment is dealt with at comparative length. We refer

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